

WHAT IS CLAIMED IS:

1 1. A FED cathode plate with an internal via,
2 comprising:
3 a substrate;
4 a resistive layer with a cathode conductor deposited
5 over the substrate;
6 a tape line located on the substrate and kept separate
7 from the resistive layer;
8 a first dielectric layer, located on the resistive
9 layer and part of the tape line and having a microtip
10 cavity to accommodate a microtip;
11 a first gate line, located over the first dielectric
12 layer and having a respective microtip hole corresponding
13 to the microtip;
14 an internal via, located on the tape line and abutted
15 against the first dielectric layer and the gate line;
16 a second dielectric layer, located on the tape line
17 and abutted against the internal via, thereby connecting to
18 an anode by an adhesive;
19 a second gate line, located on the second dielectric
20 layer and abutted against the internal via;
21 a metal layer covering the first gate line, the
22 internal via, and the second gate line; and
23 a contact, located on the tape line and connected
24 adjacent to the second dielectric layer, thereby
25 electrically connecting a lead to outside.

1 2. The cathode plate of Claim 1, wherein the adhesive
2 is located on a position of no contact with the second
3 dielectric layer and the second gate line.

1 3. The cathode plate of Claim 1, wherein the adhesive
2 is glass frit.

1 4. The cathode plate of Claim 1, wherein the
2 substrate is glass.

1 5. The cathode plate of Claim 1, wherein the resistive
2 layer is a doped layer.

1 6. The cathode plate of Claim 1, wherein the material
2 of the cathode conductor includes niobium.

1 7. The cathode plate of Claim 1, wherein the materials
2 of the tape line includes chromium.

1 8. The cathode plate of Claim 1, wherein the materials
2 of the first and the second dielectric layers are SiO_2 .

1 9. The cathode plate of Claim 1, wherein the materials
2 of the first and the second gate lines includes niobium.

1 10. The cathode plate of Claim 1, wherein the material
2 of the metal layer includes niobium.

1 11. The cathode plate of Claim 1, wherein the material
2 of the microtip includes molybdenum.

1 12. A fabrication method for the FED cathode plate
2 with an internal via, comprising the steps:
3 depositing an FED cathode structure from bottom to top
4 including a substrate, a resistive layer, a dielectric
5 layer, and a gate line;
6 etching the cathode structure to form a cathode plate
7 with the hole and cavity of a microtip, an internal via,
8 and a contact, wherein the hole is about 1.6 μm wide;

9 sloping the plate to a predetermined angle to form a
10 metal layer by evaporation, wherein the predetermined angle
11 is ranged between 10 to 30 degrees;

12 forming a microtip within the microtip cavity by
13 vertical layer evaporation, including the connection of the
14 internal via and the microtip concurrently completed; and
15 lifting off the excessive deposition on the surface of
16 the plate by immersing the plate in a chemical solution.

1 13. The fabrication method of Claim 12, wherein glass
2 is used to form the substrate.

1 14. The fabrication method of Claim 12, wherein the
2 doped silicon is used to form the resistive layer.

1 15. The fabrication method of Claim 12, wherein
2 niobium-including metal is used to form the cathode
3 conductor, the gate line, and the metal layer.

1 16. The fabrication method of Claim 12, wherein
2 chromium-including metal is used to form the tape line.

1 17. The fabrication method of Claim 12, wherein SiO_2
2 is used to form the dielectric layer.

1 18. The fabrication method of Claim 12, wherein
2 molybdenum-including metal is used to form the microtip.

1 19. The fabrication method of Claim 12, further
2 comprising the step of joining and sealing the completed
3 cathode plate to an anode with an adhesive.

1 20. The fabrication method of Claim 22, wherein the
2 adhesive is glass frit.